



A framework for allocating fishing rights in small-scale fisheries

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ABSTRACT

The FAO Voluntary Guidelines for Securing Small-Scale Fisheries have called out the need to provide secure tenure rights as a means of securing livelihoods, promoting food security, and poverty alleviation, all of which can support the human rights of small-scale fishers. However, there are few examples to be found in the literature of the necessary processes and mechanisms for allocating such rights to small-scale fishers. While in industrial fisheries the criteria for allocation are typically based on catch history data, these are likely to be unavailable for many small-scale fisheries, which will instead require different criteria for making decisions. Furthermore, as linked social-ecological systems providing both livelihoods and food to fishing communities, as well as playing important social and cultural roles, small-scale fisheries are likely to have allocation goals that differ from industrial fisheries. These may include promoting equity, preserving cultural values, ensuring the participation of marginalized groups, or setting aside fish for subsistence, among others. A process for allocating rights will require extensive stakeholder participation to elucidate these underlying goals and values and to develop solutions that best address them. This paper describes the steps necessary for engaging stakeholders in such a process and provides examples of novel fisheries allocation mechanisms that may address the concerns of small-scale fisheries.

1. Introduction

Small-scale fisheries have a significant impact on the livelihoods of people around the world. According to the UN Food and Agriculture Organization (FAO), small-scale fisheries produce about half of global fish catches, much of which is consumed in the developing world, and employ more than 90 percent of the world's seafood harvesters and fish workers. Yet despite this importance, small-scale fishers and their communities are often poor, marginalized, and lack political power (FAO, 2015). The FAO Voluntary Guidelines for Securing Small-Scale Fisheries in the Context of Food Security and Poverty Alleviation emphasize the need for small-scale fisheries to have secure tenure rights of the fishery resources that sustain their social and cultural well-being, their livelihoods, and their sustainable development (FAO, 2015). Giving small-scale fishers rights over fishery resources can allow them to exclude other users from accessing these resources, conferring the benefits of the fishery exclusively to small-scale fishers and their communities (FAO, 2015). This security may be especially important for small-scale fisheries, which are frequently at risk of being displaced by industrial fishing operations, foreign fleets, aquaculture, or other marine and coastal industries, all of which tend to be more powerful in economic and political arenas (FAO, 2015; Béné et al., 2007). In addition, recognizing and securing fishing rights for these groups may be

an important step to promoting the livelihoods and food security these fisheries provide, to providing political power to small-scale fishers, and to ensuring their resilience (Andrew et al., 2007) by changing the incentive structure of the fisheries, giving fishers greater incentives to invest in the fishery and to ensure its sustainability into the future. A number of authors have called for a Human Rights-Based Approach to small-scale fisheries (HRBA) (e.g., Allison et al., 2012), which seeks to ensure participation, address power asymmetries, and empower rights holders, especially vulnerable and marginalized groups (FAO, 2016). Secure fishing rights can be a powerful path to achieving these goals.

Paramount to a discussion of rights is the often-controversial issue of allocation, or determining who is allowed to exercise these rights, and when and how they can exercise them. Indeed, the topic of allocation is immense, relating to multiple dimensions of fishery management such as enforcement, sustainable catch limits, and multiple layers of social and economic considerations. When considering the allocation of rights to individuals or entities within a fishery, rights may be allocated individually or collectively, they may be allocated in the form of a limited entry system (such as fishing licenses), harvest quotas (including Individual Quotas (IQ), Individual Transferrable Quotas (ITQs), etc.), area access (including Territorial Use Rights for Fishing [TURFs]), or another means of granting access to fishery resources (Charles, 2001). However, because of the often complex nature of small-scale

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fisheries, including their social, economic, and cultural importance and their inherent linkages to larger social, ecological, and political systems (Andrew et al., 2007; McClanahan et al., 2009; Hauck and Gallardo-Fernandez, 2013), allocation of fishing rights is likely to be equally complicated in such a context. Indeed, Hanna and Smith (1993) note that allocation decisions are the “most conflict-producing type of management decision” that must be made during the course of fishery management design because they necessarily involve excluding participants from the portion of the resource allocated to another individual or group. There are few models in the literature for how to allocate fishing rights in small-scale fisheries, where such a process needs to address different concerns and will thus look very different than one for allocating fishing rights in an industrialized fishery. This paper addresses this gap by laying out a process for allocation of fishing rights among members of a small scale fishery or community and providing examples of relevant allocation mechanisms. Further, while we acknowledge the existence of allocation disputes between small-scale fisheries and larger scale, industrial fisheries that target the same species, here we refrain from attempting to resolve these issues, limiting our scope to the rarely addressed problem of how to allocate fishing rights within a small-scale fishery.

There are numerous challenges to be overcome in considering how to allocate rights in small-scale fisheries. First, decisions to be made regarding allocation – who should be allocated rights, and what kinds of right (e.g., how much fishing quota, how or whether to access a fishing area) – are often made based on previous history in the fishery. The literature provides a number of examples of processes for allocating fishing rights among participants in industrialized fisheries, where data on catch history of individual fishers are typically available, including data on who has fished for what and how long they have fished for it (e.g., Shotton, 2001; Hanna and Smith, 1993). Basing allocation decisions on catch history or other economic considerations is often done to preserve the status quo and acknowledge previous investment among fishers, sometimes granting the largest allocations to those fishers who have accumulated the most catch history or the most capital (Shotton, 2001).

When allocating fishing rights in small-scale, data-poor fisheries, extensive data on participation are likely not available. Moreover, the underlying rationale for using catch history – to preserve the status quo or reward capital investments – may not be applicable in these contexts. Where small-scale fishers are competing with industrial fishers for fishing rights, relying on catch history or other economic considerations to allocate rights or access can further disadvantage small-scale fishers because historical catch records may not exist for small-scale fisheries, and because they are likely to have smaller catches or be less efficient than their industrial counterparts. This may mean small-scale fishers are not granted sufficient rights in an allocation process to maintain their existing catch levels, or may be left out of the process altogether because of a lack of data upon which to base an allocation of fishing rights. Thus, the lack of information combined with the needs of small-scale fisheries will require other means of determining who should be allocated access to fishery resources.

Given the potential importance of allocating rights in small-scale fisheries, and the challenges inherent in doing so, allocation must be done thoughtfully and carefully. Unfortunately, the process of allocating fishing rights has rarely been explicitly considered in the literature, especially in regards to allocation of rights within small-scale fisheries. Thus there is a need to examine this phase of fisheries management design more carefully, and to explore how allocation decisions can be made through a more intentional and inclusive process that can avoid or address the challenges discussed above.

Here we describe a process for allocating fishing rights within a small-scale fishery in a way that does not rely upon fishery data, and that recognizes the unique social, cultural, and human well-being aspects associated with small-scale fisheries. The approach we describe is intended to address allocation issues within a single fishery, as opposed

to allocating among or re-allocating rights between different fisheries (such as between a small-scale fishery and an industrial-scale fishery), although the principles outlined here would largely apply to such a process. We also present a number of allocation mechanisms drawn from both real-world and theoretical examples that may effectively address some of the values and needs of small-scale fisheries stakeholders. This approach is highly participatory in order to make possible the elicitation of stakeholder values and to incorporate and consider their diverse perspectives and needs, with the aim of increasing the legitimacy of the outcomes. While we don't presuppose that such processes necessarily lead to universally accepted outcomes, an approach that is responsive to the social needs of a fishery, and that uses a highly participatory process to achieve that end, will tend to have a high likelihood of achieving buy-in, and increase the chances of acceptance and success (Battista et al., 2016; Campbell et al., 2010; Cinner et al., 2012; Lebel et al., 2006; Olsson et al., 2004; Ostrom, 1990; Reed, 2008). This approach draws on human rights-based approaches, including incorporating the principles of “participation, accountability, non-discrimination, transparency, human dignity, empowerment, and the rule of law” (FAO, 2016), into an allocation process.

2. Setting the stage for allocation

The context in which small-scale fisheries operate and the societal goals that should be met through rights allocation are often vastly different than for industrialized fisheries. In many industrialized fisheries, rights allocation is driven largely by the desire to respond to the needs of existing fishery participants, and to do so in a way that is essentially a tradeoff between economic efficiency and equity (in other words, the “winners” will be the participants who have historically derived the greatest economic value from the fishery). Allocations in this context are largely done via two approaches: allocating based on catch history of existing fishery participants, or through quota auctions (Bailey et al., 2013). Small-scale fisheries in the developing world are often connected to underdeveloped economic systems where the livelihood options available are much more limited. Even within developed economies, small-scale fishers are frequently economically marginalized, and consequently the effects of allocation and exclusion are very different. In small-scale fisheries in the developing world, fishers, fish workers, and their communities are frequently dependent, sometimes entirely so, on access to fishery resources for food, income, and broader economic benefits to the community (FAO, 2015). Additionally, small-scale fisheries may have social and cultural importance that extends beyond the monetary and nutritional benefits they provide to fishing communities. As such, the cultural context and the values that will determine the criteria for allocation of fishing rights may be very different from those in industrialized fisheries. Stakeholders may wish to ensure that the “winners” of an allocation process are individuals or groups whose participation in the fishery contributes to particular societal outcomes, rather than those who have been the most economically efficient. Thus, there must be other means of assigning allocations beyond a reliance on catch history data, including factoring in criteria such as traditional use, conservation activities, and dependence on the fishery for livelihoods and subsistence.

While cultural context and values will determine the objectives for an allocation process, there are some components of all processes that are fundamentally the same. Any allocation process must determine who deserves rights to access and harvest fishery resources, how rights are allocated (at the individual or group level), how much of the fishing right (e.g., catch, fishing effort, area) will participants receive, the nature of the right (i.e., what kind of rights – access, management, withdrawal, alienation – are being allocated), the conditions attached to these rights, and who is to be excluded from these rights.

2.1. Enabling conditions

There are certain enabling conditions that must be in place before a process of allocating rights within small-scale fisheries can take place. A challenge for allocating fishing rights in such fisheries arises from the fact that many small-scale fisheries exist in a low governance context, which we define as lacking the regulatory structures or government capacity sufficient to enforce fishing rights or regulations. Where fishing rights are not able to be affirmed and enforced by the government, or a body with enforcement capabilities, they are in danger of being infringed upon and eroded by other fishing and non-fishing interests, even if they have been allocated in theory.

In some instances, co-management arrangements can substitute for higher-level management by government, meaning fisheries could be collectively managed by a group of users, or cooperatively managed along with the government. Principles of collective action can be used to determine whether conditions are present that support the development of such arrangements. Elinor Ostrom (1990) identified eight principles necessary for the collective management of resources which can be considered important enabling conditions for allocating rights in a context where government lacks sufficient fisheries management capacity to do so, where decisions about, and enforcement of, allocation decisions are likely to be done collectively through the community or a user group. The first is having clearly defined boundaries. This is critical when designing and allocating access to a TURF or other spatially defined area, but it is equally important when allocating rights to a particular fish stock. Additionally, the concept of clearly defined boundaries applies to the stakeholders themselves; there must be a clearly defined and limited group of users to whom rights are allocated. Another important principle from Ostrom's framework is to ensure the rights of stakeholders and the results of the allocation process are respected and enforced by the relevant authorities. While the capacity for sufficient enforcement by government may be limited, there should at least be a mechanism that confers the right of the co-management entity to formalize and enforce the fishing rights in place. Likewise, monitoring and graduated sanctions for violations of the rights, whether formal or informal, helps ensure that the rights are upheld and that the outcomes of the allocation process are adhered to. Absent these factors, allocating fishing rights is not likely to be successful in a low governance context.

Where external monitoring and enforcement of the rules is not feasible, trust is another important condition which should exist among stakeholders before an allocation process can succeed (Turner et al., 2016). Stakeholders must trust that others will not fish beyond their allocation – whether fishing more than their quota, exceeding a collective catch limit, or fishing in areas they have not been granted access to. Through a participatory, stakeholder-driven allocation process like the one outlined below, stakeholders may be able to build some of the trust necessary for successfully managing fishery resources in a low governance context. An allocation process that is transparent and is based on the identified goals and values of stakeholders is much more likely to achieve buy-in and compliance than a top-down process that does not fully account for stakeholder goals (e.g., Stewart et al., 2010; Turner et al., 2016; Arias, 2015). In a low governance fishery, trust may take the place of legal mechanisms for enforcement and adjudication to some extent, but where trust does not exist and stakeholders are unable or unwilling to monitor the actions of others to ensure compliance, allocating fishing rights may not ultimately confer the anticipated benefits.

Allocating fishing rights is necessary, but not sufficient, for ensuring the desired outcomes can be produced. Fishers and other stakeholders must also have access to be able to exercise these rights. This may include legal mechanisms to ensure access to the fishery is not somehow impeded, whether by other stakeholders or through other means, as well as having access to the necessary resources, including access to capital and markets, along with sufficient power to be able to realize

the benefits of the fishery (Ribot and Peluso, 2003).

Along with ensuring the correct enabling conditions are in place to allocate and uphold rights in a fishery, it is necessary to understand the broader social, economic, cultural, and ecological context in which the fishery is operating (McClanahan et al., 2009). Fisheries do not exist in a vacuum, but rather they are part of a social-ecological system in which many interactions between the fishery, the ecosystem, and the larger society exist (e.g., Ostrom, 2009; Berkes and Folke, 2000; Berkes, 2010; Hauck and Gallardo-Fernandez, 2013). Hence, how small-scale fisheries perform is frequently a function of what happens outside of the fishery (Jentoft, 2014). This means efforts to allocate fishing rights and manage a fishery can be derailed by a number of external factors (Hauck and Gallardo-Fernandez, 2013; Kittinger et al., 2013). These may include important social concerns, like extreme poverty, hunger, or conflict (Allison et al., 2012; Mani et al., 2013; Mullainathan and Shafir, 2013); economic factors, such as markets that affect the price of fish, the variable demand for a target stock, or the availability of substitutes (e.g., Andrew et al., 2007; Kittinger et al., 2013); or ecological factors, including pollution, habitat loss, or climate change that may affect the health of the fish stocks (Allison and Ellis, 2001; Andrew et al., 2007; Kittinger et al., 2013; Battista et al., 2017), among numerous other drivers. For example, participation in fisheries in developing countries is often determined by external economic factors – fishers sometimes exhibit high mobility in and out of fisheries and significant livelihood diversification, with fishers often participating in farming, aquaculture, or other activities for additional income, depending on which activity will yield the highest income at the time (Allison and Ellis, 2001). Accounting for this mobility and the role fisheries may play in diversifying livelihoods can be an important consideration in allocating rights.

Fishing rights can reduce economic and/or food insecurity by ensuring the ability to access fishery resources and to manage those resources in ways that allow stakeholders to attain certain socioeconomic benefits. Where small-scale fishers and fishing communities are dependent on these resources, the right to access these resources, and perhaps more importantly, the right to exclude others from these resources, can be critically important. A number of authors have described the need to address broader human rights issues alongside fishing rights through a human rights-based approach (e.g., Allison et al., 2012; Ratner et al., 2014). Allocating fishing rights in small-scale fisheries in an equitable manner can be a means of promoting human rights through upholding the HRBA principles of participation, accountability non-discrimination, human dignity, empowerment, and the rule of law (FAO, 2016), and can improve the stability and economic outlook for vulnerable or marginalized stakeholders. However, often the factors leading to poverty and marginalization among small-scale fishers extend beyond lack of access to resources and are instead driven by systemic poverty, exclusion, and vulnerability in rural fishing communities. In cases where poverty, hunger, and/or violence are so severe that stakeholders are incapable of long-term planning, those issues may need to be addressed before or concurrently with implementing an allocation process (Allison et al., 2012; Kittinger et al., 2013). An allocation process will need to recognize and account for these extra-fishery factors, and how they will affect the fishing rights that are allocated, including the ability of stakeholders to access these rights; a failure to do so may ultimately lead to failure of the allocation process.

2.2. Lessons from allocation processes around the world

The concept of assigning fishing rights to small-scale fisheries in the developing world is, of course, not new. There are numerous examples, such as customary marine tenure systems, that date back centuries and which conferred fishing rights to members of a community, tribe, or family and facilitated the sharing of marine resources (FAO, 2015; Ruddle et al., 1992). In many small-scale fisheries, allocation has been

done not by assigning individual quota to fishers but by granting access to fishing areas individually or collectively, including using TURFs or other spatially designated management areas. Allocating rights to access an area rather than a portion of the catch may be more feasible for a multi-species fishery or in a data-poor context where assigning quota would be challenging due to a lack of data on stock size. While there are multiple considerations and examples of rights allocations, here we discuss two empirical examples of allocation in a small-scale fisheries context – one example of a system that appears to have had some success in meeting the allocation goals of stakeholders despite a lack of extensive catch history data, and one example of an allocation system that appears to have been met with failure in the attainment of certain objectives, and that failure can be at least partially explained by a failure to actively identify and engage some of the appropriate stakeholders in the process.

2.2.1. Chile TURF system

Chile has an extensive TURF system for loco and other species. Some of these TURFs appear to have been effective at meeting the socio-cultural goals of preserving local traditions and artisanal techniques in a small-scale fishery, without relying on extensive catch history data to do so. The TURFs are allocated by the government to organized groups of artisanal fishers who co-manage the areas along with the government, requiring fishers to organize as collectives which may include cooperatives, unions, or guild associations (Hauck and Gallardo-Fernández, 2013). Their members must be exclusively licensed artisanal fishers who reside in the area adjacent to the TURF, which ensures that artisanal techniques endure, and that migratory fishers will not divert the benefits flowing from the fishery away from local communities (Bonzon et al., 2013). The groups cannot exclude any fishers who meet the criteria, but they can place additional requirements on membership that may serve as barriers to new entrants (Cancino et al., 2007). There are catch limits on loco, which in some cases may be further sub-allocated among members, who each receive an equal share (Cancino et al., 2007), or in other cases fishers may fish until the catch limit is reached (Bonzon et al., 2013). The design of this allocation system enables the development of TURFs that meet stakeholders' primary goals of protecting artisanal fishing traditions and increasing territorial power over area-based conflicts with other sectors. Key to this success appears to have been partially due to the formal elucidation of allocation goals that guided the design of the allocation system and process.

2.2.2. South Africa re-allocation process

In contrast to the Chilean story, an attempt to re-allocate fishing rights in post-apartheid South Africa to address socioeconomic consequences of institutional racism and oppression provides an example of an allocation system that failed to meet stakeholder goals. This appears to be due – at least in part – to the fact that not all of the appropriate stakeholders were identified and engaged in the goal setting and allocation design process. Ensuring diverse and representative participation of resource users in an allocation process is important not only for promoting equity, but because a failure to do so can result in a failure of the entire allocation process. Historically, commercial fisheries in South Africa were not inclusive of black South Africans who relied on those coastal resources to survive (Hauck and Gallardo-Fernández, 2013). These fisheries were and continue to be heterogeneous, with a mix of races, genders, socioeconomic statuses, and sectors, including industrial, small-scale, subsistence, and recreational sectors. The 1998 Marine Living Resources Act (MLRA) allocated fishing rights in a way that considered trade-offs between sustainability, economic efficiency, and equity (Hauck and Gallardo-Fernández, 2013), and included mechanisms to include historically disadvantaged persons (HDP) (Joubert et al., 2007). Ultimately, however, they were unable to increase social and economic mobility for marginalized groups, at least in part because the process did not sufficiently include and consult stakeholders. The result was a perceived lack of legitimacy

of the process, which in turn led to rampant illegal fishing, a large black market for marine resources, particularly abalone, and ultimately, to the closure of the abalone fishery (Raemaekers et al., 2011; Hauck and Gallardo-Fernández, 2013).

Multiple components of the allocation designation system precluded historically marginalized fishers from participating in the decision-making process and subsequently from receiving sufficient access to harvest in the fishery. In some cases, allocation rights were granted within historically oppressed communities, but given to local elites instead of bona fide fishers (Isaacs, 2011). In other cases, HDPs were burdened by administrative constraints and lacked the infrastructure and capital to be eligible to exercise their fishing rights (Stewart et al., 2010; Isaacs, 2011). Furthermore, the system tended to favor individual – rather than collective – quota allocations, which denied the very possibility of disenfranchised groups to coordinate and have enough infrastructure to be eligible for harvesting rights (Isaacs, 2011). Ultimately, the allocation system was seen as a failure because the decision makers were unable to holistically and substantially understand, consider, and include the social, political, and economic context of a post-apartheid fishery (Hauck and Gallardo-Fernández, 2013).

3. A framework for developing an allocation process

In small-scale fisheries, where the ability to access fish resources is intricately linked with ensuring community well-being and the protection of human rights, and where trust is essential for upholding fishing rights, allocating fishing rights requires a careful planning process that engages all of the necessary stakeholders. An allocation process that is inclusionary and empowers fisheries stakeholders to develop an allocation scheme that addresses the unique and specific needs of a small-scale fishery cannot be done from a top-down approach but must be done through a participatory, stakeholder-driven process that considers and incorporates the goals and values of fishers and other stakeholders (e.g., Berkes, 2010; Stewart et al., 2010). Such a process should be led by a neutral facilitator, which may be a fishery manager or another third-party negotiator, and systematic decision support tools or processes should be employed to facilitate this participatory process. While there may be a question of who determines who will be included or excluded in an allocation process, what is described henceforth assumes a good faith effort on the part of whoever is initiating an allocation process to seek an equitable outcome. Here we present a step-by-step process (Fig. 1) for designing a method to allocate fishing rights to small-scale fisheries drawing on best practice principles for a participatory process.

3.1. Stakeholder identification

A precursor to any good participatory process is to understand who needs to be engaged in the process and brought to the table (Lebel et al., 2006; Reed et al., 2009; Cinner et al., 2012). This is particularly important for an allocation process, because any stakeholders who do not participate are unlikely to be allocated fishing rights. Small-scale fishers are more likely to be left out of traditional allocation processes for a number of reasons. First, they are less likely to have documented catch history, and they have less economic investment in the fishery. Often they may have a diverse fishery portfolio – they may be more likely to switch among fisheries and gear types based on availability and seasonality, rather than specializing in a particular fishery as industrialized fishers are more likely to do. Thus, they are frequently at a disadvantage when it comes to laying claim to fishing grounds or stocks.

Second, small-scale fishers are frequently disenfranchised (FAO, 2015; Béné et al., 2007). Therefore, although they may have the most to lose in an allocation process by losing access to particular fisheries they depend on, particularly in fishing communities with few economic alternatives, small-scale fishers may not be empowered to participate in allocation discussions and processes.

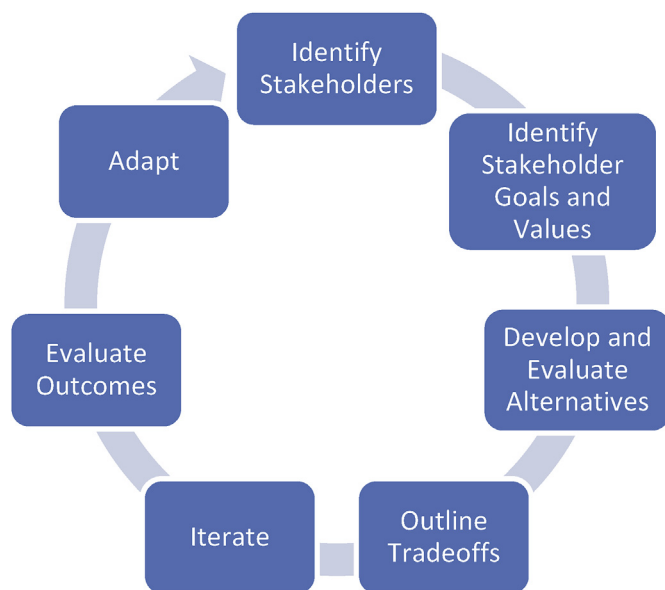


Fig. 1. The necessary steps in a process for allocating fishing rights.

Third, there may be a significant opportunity cost for some fishers or other stakeholders to attend meetings or participate in other ways, including time taken away from fishing, childcare, or other necessary activities, which can further disadvantage these stakeholders. In particular, there may be groups of marginalized stakeholders who deserve consideration in an allocation process, such as religious or ethnic minorities, the poor, or women, who may not even be aware that there are pending fisheries management reforms. Consequently, even if a formal allocation process takes place, without adequate measures in place to actively identify and engage all impacted stakeholders, these groups may become further disenfranchised, losing access to fisheries rather than securing them.

Rarely will the stakeholders who need to be considered in an allocation process be comprised of a single, homogeneous group of fishers. There may be fishers with different gear types, different vessel sizes, and from multiple ethnic groups. Stakeholders may be confined to a single village, in the case of fisheries that are highly spatially defined or exhibit low mobility (such as shellfisheries), or may come from many wide-spread communities, in the case of more migratory species. In addition, the stakeholders who should be considered in an allocation process may extend beyond the fishers themselves. Fish workers, including post-harvest processors and sellers, may also be reliant on fishery resources for their income. Frequently, this post-harvest processing is done by women, sometimes as informal employment (such as women who process and/or sell their husbands' catch), and in some communities women may have few other livelihood alternatives. Furthermore, families in some rural fishing communities may rely on fish for a substantial part of their diet (FAO, 2015; Béné et al., 2007). An equitable allocation process may need to consider how to meet the needs of these stakeholders in addition to the fish harvesters, and may therefore include fish workers and/or women in the process.

There are some tools that can be used to identify who should be at the table for discussions about allocation – these may include one of several methods available for stakeholder analysis (e.g., Grimble and Wellard, 1997; Reed et al., 2009) or social network analysis (Wasserman and Faust, 1994; Granovetter, 1973). Otherwise, there are a few questions fishery managers or others leading these processes should be asking to ensure sufficient stakeholder representation: Who stands to benefit from an allocation process, and who stands to lose out? Who is likely to support such a process, and who is likely to oppose it? These questions may ensure the necessary stakeholders are represented in the process, rather than simply including the loudest or most obvious

voices. Along with a diversity of interests invariably comes an imbalance of influence and power among stakeholders. Certain external actors, including from industrialized sectors or non-fishing sectors, may have an outsized influence on the fishery (FAO, 2015), and where an allocation process is seeking to replace an existing allocation of fishing rights, whether formal or informal, those who currently possess access to the fishery are likely to hold more power. Ultimately it may not be possible to ensure the process is entirely equitable because of existing power dynamics among actors, but a good participatory process designed to reduce such power imbalances (for example, through the use of an impartial facilitator or arbitration board) will increase the likelihood that allocation is done fairly. Bringing all stakeholders to the table and engaging them in an allocation process does not mean each will get the outcome s/he prefers, but it does help ensure that the process can arrive at an outcome that each stakeholder finds acceptable and believes resulted from a fair process. Further, attempts to empower marginalized stakeholders through a participatory process can have the added benefit of reducing power imbalances in the fishery by producing more equitable outcomes.

Along with ensuring the right stakeholders are involved, making sure the government is engaged, and at the appropriate level, is equally important (Pomeroy and Berkes, 1997). There must be support from the appropriate government entity to validate and enforce allocation decisions where necessary. The right level of government may depend on the ecological scale of the resources, and the geographic scale of the users. In cases where there is low capacity for the government to engage in such a process but sufficient capacity exists among stakeholders to organize and undertake an allocation process, the government should at least support such an effort and uphold its outcomes.

3.2. Identifying stakeholder goals/values/needs

The key to developing an allocation process that is seen as legitimate and has buy-in from stakeholders will be to understand what various stakeholders' aspirations and underlying values are for such a process. In essence, allocation decisions are decisions about who the “winners” and “losers” in a fishery will be, and it is critical that stakeholders understand this and make careful, deliberate, and intentional design choices based on a shared vision for the future of their fishery. A clear goal (or goals) for allocation that is understood and accepted by all stakeholders, and with clear objectives that can be tracked, should be identified (Hanna and Smith, 1993). Because small-scale fisheries often play many important roles for fishing communities and are such an integral part of their cultural, social, and economic systems, the goals stakeholders might view as important are likely to be diverse and sometimes at odds with one another. Possible goals for allocating rights within small-scale fisheries are likely to include a mix of social, economic, and conservation outcomes. Not all of these goals are mutually exclusive, and different stakeholder groups may hold different goals as more important than others. Often fisheries management processes suffer from poorly defined social goals, in particular (Pascoe et al., 2014); clearly identifying a set of goals that are agreed upon by stakeholders upfront is critical to a successful process. Surprisingly, many fishery allocations have been made without considering goals other than to stabilize access to resources (maintain the status quo) or to reward capital investment or catch history. But allocation can also be used to achieve these other goals.

Furthermore, a participatory process should also seek to identify the current challenges that face various stakeholders that could be addressed through an allocation process. This may include issues of access as well as rights to fish – where economic, regulatory, or other barriers exist preventing disadvantaged or vulnerable stakeholders from accessing the fish allocated to them (Ribot and Peluso, 2003), these should be identified and, to the extent possible, removed.

Hanna and Smith (1993) point to the success of participatory processes in two allocation cases for Pacific fisheries in the U.S., precisely

because such a process allowed each stakeholder group to understand the objectives of others and to see them as supportable. Understanding each other's perceptions and preferences allowed stakeholder groups to find common ground in the allocation process (Hanna and Smith, 1993). A manager or facilitator should not only determine each stakeholder group's goals for the process, but also the values underlying them. Approaches such as Human-Centered Design may be effective to better understand what stakeholders' values are, and what challenges they face, and then to design a process around them (e.g., Sorice and Donlan, 2015). Understanding what stakeholders value can help to arrive at solutions that are aligned with these values, even if they do not meet each stakeholder's explicit goals since stated goals are sometimes bargaining positions rather than deeply held interests or values (Fisher and Ury, 2011).

3.3. Developing and evaluating alternatives

Once stakeholder goals and values are identified, stakeholders and facilitators can work together to develop scenarios or other means of determining criteria for making allocation decisions (e.g., Andrew et al., 2007). Application of a formal decision support system or strategy evaluation process can help to allow stakeholders to continue to participate in the decision-making process. A number of different types of tools can be employed here to assist with this process. Multi-Criteria Decision Analysis (MCDA) is one approach for comparing alternatives using a number of different explicitly developed criteria that has been employed in fisheries. This method, which employs a structured and transparent process for identifying and ranking valued criteria, can be used in participatory planning approaches to help stakeholders make decisions (e.g., Joubert et al., 2007; Stewart et al., 2010; Estévez et al., 2013). Such a process can help to clarify the decision problem, develop alternatives, weight criteria, and identify tradeoffs. For example, Joubert et al. (2007) proposed a MCDA-based approach to evaluate new applicants to a South African rock lobster fishery as a simple and transparent approach to allocation which stakeholders could easily understand. This approach was ultimately not adopted, and the more complex allocation process that was used lacked transparency and was litigated in court (Stewart et al., 2010).

In determining exactly how to allocate fishing rights to fishers based on the allocation mechanism(s) selected, the participants in the allocation process may wish to identify any available data which can be used to determine how to allocate fishing rights. These data can then be applied to the MCDA or another tool to determine a formula for allocation. For example, stakeholders that have a goal of using the fishery to support a community could base allocation decisions on the number of crew a vessel employs from the local community. Alternatively, stakeholders that have a goal of rebuilding a stock could reward fishers that use fishing gears that avoid that stock. There are many other possible examples.

Often approaches such as MCDA are used when abundant data exist with which decisions can be made. However, these approaches can also be helpful in the absence of existing data, as they are flexible enough to incorporate both quantitative and qualitative information in models (Estévez et al., 2013). Stakeholders can score various criteria to generate qualitative data to aid in decision-making. Other types of decision-support tools developed to aid participatory processes may also be helpful in allocation. What is critical at this stage is engaging the stakeholders in the process of determining the criteria upon which allocation decisions should be made, and then developing a set of allocation alternatives based on these criteria.

There are numerous possible mechanisms for allocating fishing rights that could be developed from such a process, determined by the particular goals of stakeholders. Some of these goals might include: maintaining the current levels and make-up of participation in the fishery to promote stability in the fishery and the post-harvest sector; decreasing the total number of participants in the fishery to improve

sustainability or profitability; promoting equity among fishers by allocating fishing rights equally or by redistributing fishing rights to empower those who have been disenfranchised (e.g., attempts at redistribution in South African fisheries (Raemakers et al., 2011); ensuring access to the fishery for traditional or subsistence users; setting aside licenses or quota for young people to enter the fishery in the future; or ensuring access for the very poorest members of a community who may need to turn to fishing an important source of temporary or seasonal income, and a buffer against hunger (FAO, 2015; Andrew et al., 2007; Béné et al., 2007).

The questions that need to be identified in the alternative allocation scenarios developed by stakeholders may include: who will be allocated fishing rights, including which individuals or groups; whether any redistribution or reallocation will need to occur; what types of rights will be allocated (what do the rights permit); whether the rights will be allocated individually or collectively to a group; if they are to be allocated collectively, whether there will be sub-allocations; and whether rights will be allocated indefinitely or for a finite amount of time (e.g., Poon and Bonzon, 2013; Bonzon et al., 2013). Rights may be granted exclusively to harvesters, or an allocation process may consider the rights of other stakeholders in the fishery, including groups who have often been disadvantaged by allocations, such as women involved in post-harvest processing (FAO, 2015), subsistence fishers, individuals who fish to maintain certain cultural traditions, or migratory fishers. Through all of these decisions, stakeholders can determine which user groups will benefit from their fishery, either directly or indirectly, and which outcomes they wish to prioritize, and can thus begin to design the system they wish to see realized. Some examples of possible mechanisms for allocation, and the specific goals they address, are included in Table 1.

3.4. Addressing tradeoffs

Coming to an agreement about allocation will undoubtedly involve tradeoffs for many or all stakeholders involved. Explicitly laying out what these tradeoffs are, and who wins and who loses from each possible scenario, is essential to arriving at an outcome that most closely aligns with the stakeholders' goals. As is always the case in fisheries management, not all of the identified goals and objectives can be met simultaneously, or at all (Mardle et al., 2002). For example, where large-scale fisheries have an existing allocation that will be redistributed or have otherwise had unrestricted access to the fishery, their goals may be incompatible with the goal of ensuring access to the fishery for small-scale fishers, and the process may have to consider additional incentives to engage them. Elucidating and dealing with tradeoffs is a way to allow stakeholders to identify which goals and thus which outcomes are most important to achieving.

Allocating fishing rights will in all likelihood include the exclusion of some users or stakeholder groups, and in cases where formal or informal rights already exist, the reallocation of rights to and from stakeholders. The anticipated impacts of this process should be identified and incorporated into the tradeoff analysis to the extent that likely primary and secondary impacts are understood. For example, where fishing rights are to be allocated to a fishing community to the exclusion of migratory fishers or neighboring communities, the effort of these fleets is likely to be displaced somewhere else. These impacts should be considered in an analysis of tradeoffs. The process may also incorporate efforts to mitigate the impacts of exclusion on these "losers", including but not limited to directing these participants into other fisheries, alternative livelihood projects, or compensation.

Effectively addressing tradeoffs and ensuring successful outcomes as benefit flows are re-directed thus depends on taking a holistic view of the system, which in turn depends on following a truly representative, and skillfully facilitated, participatory process, as described above.

3.5. Iterating

A critical component of an allocation process will be iterating on goals, alternatives, and tradeoffs to improve possible outcomes. As stakeholders participate in a process, their positions with respect to allocation may change by better understanding the goals and values of others. Laying out alternatives and identifying tradeoffs can allow stakeholders to go back and revise their positions once they understand what may be gained or lost from particular outcomes, and so iterating through multiple rounds of developing alternatives and reviewing tradeoffs can lead to a better allocation solution. A suitable allocation solution may not be found in the first round of alternatives, but perhaps as stakeholders continue to iterate on alternatives and tradeoffs they will arrive at a solution agreeable to all parties.

3.6. Evaluating outcomes

As with any good process, monitoring the system and evaluating outcomes is important for ensuring that the outcomes are upheld, and for learning lessons from and improving upon the allocation process. Ecological, economic, and social outcomes should all be evaluated to understand the intended and unintended impacts of the allocation on the resources, users, and other stakeholders over time and to hold people accountable to the fishing rights and responsibilities that have been allocated.

3.7. Adapting

Re-allocating existing fishing rights can be particularly difficult. However, mechanisms can be built into allocation processes to allow for future revision and adaptation, particularly once their outcomes have been evaluated. A timetable can be built into an allocation process to identify a point in the future at which the allocation agreement will be re-evaluated and perhaps re-negotiated (Hanna and Smith, 1993). Fishing rights may be allocated for a set period of time, or indefinitely. Many TURFs, for example, are typically allocated for 10 or 20 year periods, or in perpetuity (Poon and Bonzon, 2013). An important component of fishing rights is that they are secure (i.e., not modified frequently or unpredictably), which enables stakeholders to engage in long-term planning. At the same time, local ecological, social, demographic, and economic factors may change, the values and priorities of stakeholders may evolve. Critically, climate change may cause shifts in distributions and abundance of target species (Kleisner et al., 2016; Cheung et al., 2009; Nye et al., 2009), which may require changes to the initial allocation as the allocated species are no longer available in the numbers or locations they once were. As stocks shift in distribution, they could move into areas fished by other groups of stakeholders not even considered in the initial allocation process. Small-scale fishers may find themselves forced to migrate to continue to access targeted fish stocks or risk losing the ability to fish these stocks. Thus, it is necessary to identify the appropriate length of the allocation period in order to balance adaptability and security in a given fishery. Decisions about allocation can have significant impacts on the resulting adaptability and resilience of the fishery to system change. Ensuring that an allocation system is adaptive, and able to make appropriate changes to allocation mechanisms in the future will ensure that the fishery can continue to meet needs and address challenges in dynamic systems over the long term (Allen et al., 2011; Fujita et al., 2017).

In addition, creation of an effective appeals process where participants can refute allocation decisions with legitimate cause will be critical to long-term system equity and efficacy (Bailey et al., 2013; Bonzon et al., 2013). Such a process should focus on the information used to determine the allocated amounts, rather than on the suitability or legitimacy of the criteria on which allocations were determined.

4. Applying the allocation framework to a small-scale fishery

To better understand what types of allocation mechanisms might be applicable to the kinds of goals that might be important to small-scale fisheries in the developing world, we convened a workshop with fisheries management experts from around the world to identify some of the fisheries management goals that can be met through allocation, and to identify approaches to allocating fishing rights that could meet these goals. We employed a human-centered design process (IDEO, 2015) to identify and develop fishery rights allocation approaches that meet various conservation and socioeconomic objectives as defined by users of allocation processes. Human-centered design seeks to develop effective solutions by gaining an in-depth understanding the needs of the end users, creating and prototyping novel approaches to a problem, and iterating on them (IDEO, 2015; Sorice and Donlan, 2015).

We used information gathered from the workshop, including existing allocation challenges identified for a number of fisheries around the world, to walk through the framework described above using a hypothetical fishery to illustrate the steps in an allocation process. While the framework has not yet been directly applied to a real-world fishery, this hypothetical scenario is informed by real-world challenges and provides an example of our recommended process in action.

Our hypothetical fishery is a small-scale, multispecies fishery that primarily targets grouper along with a handful of other small finfish, bivalves, and crustaceans. There are a number of existing challenges in this fishery, including overcapitalization, and in recent years new demand for grouper has led many new fishers to enter the fishery from other parts of the country, traveling to the community each season to fish. These newer fishers tend to be more efficient (catching more than the older vessels), as well as better organized. Another important challenge is that as the grouper fishery has become increasingly overfished, these fishers have become more and more interested in the other species being caught in the area, including both those covered by their “finfish permits” (e.g. snapper), and those outside the scope of those permits, like crab and clams, that have traditionally only been caught by subsistence fishers. These other species are not currently under any formal management system, and are thus at risk of being overfished as well.

4.1. Stakeholder identification

Beyond simply identifying the stakeholders as “fishers” and “community members,” it is important in this step to break down the stakeholders into finer-scale groupings to allow for a clearer understanding of their variable goals and values. In this case, we identified a more complete list of stakeholders who might need to be considered, which includes: local artisanal fishers; migratory fishers who come to fish for the season; women and other community members engaged in shellfish gleaning or other subsistence activities; community members who engage in post-harvest processing (Fig. 2).

4.2. Identifying stakeholder values and goals

Based on stakeholder values (Fig. 2), we identified the following goals relevant to allocation for our hypothetical fishery:

- Enhancing economic viability, security, and adaptability of the fishery
- Protecting/restoring stock and ecosystem health
- Preservation of fishing opportunities/access to the fishery for local community members and long-term fishers
- Preservation of artisanal sector and improvement of their adaptive capacity
- Ensure inter-generational equity (mechanism to allow for new entrants)
- Reducing inter-sector conflict and maintaining collective stability

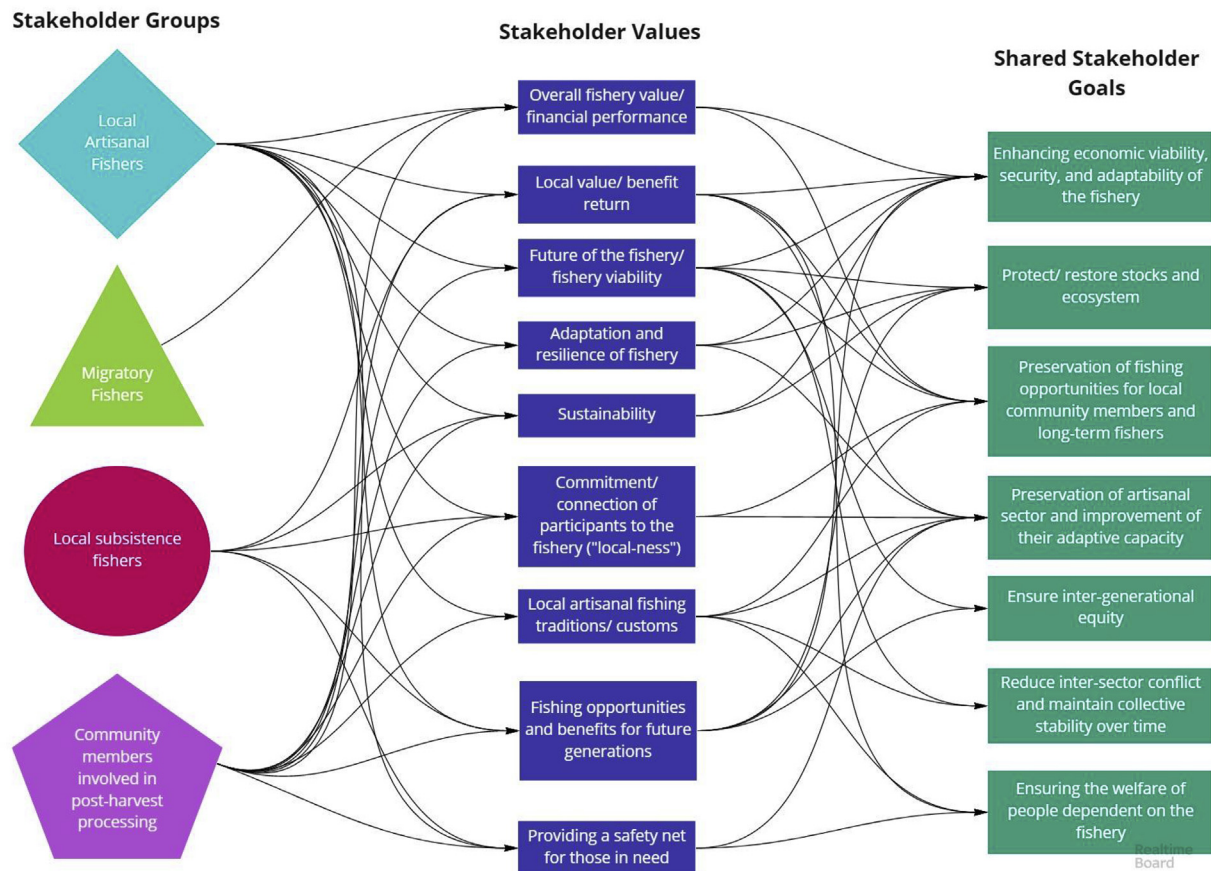


Fig. 2. Stakeholder groups and their allocation-relevant values and resulting shared fishery goals.

over time

- Ensuring the welfare of people who are dependent on the fishery (subsistence fishers)

This list includes goals that would be considered to be primarily “economic” in nature, as well as those that focus on “biophysical/environmental” values and those that focus on “sociocultural” values. As is often the case, there is significant overlap between these categories. While the first two goals on the list will theoretically be met directly through implementation of rights-based management in the long-term (i.e., by ending the race to fish), there are additional allocation decisions that can also enhance these outcomes.

4.3. Develop and evaluate alternatives

Developing a set of potential allocation mechanisms to meet the identified stakeholder goals requires reaching beyond the examples available in the literature. The human-centered design approach applied at the workshop resulted in several new examples of allocation mechanisms that do not rely on previous catch history, can be applied in relatively low governance contexts, and address some of the common goals or challenges of small-scale fisheries, moving beyond a focus on rewarding economic efficiency and investment (Table 1). They address a number of goals identified by experts and stakeholders in various fisheries that are applicable to our hypothetical fishery and described above. These could be considered allocation alternatives for this particular hypothetical situation.

Closer examination of each of these options might reveal that they may each in fact help to meet multiple goals. For example, in Fig. 3 below, thick arrows indicate goals that a given allocation mechanism is designed to meet, while thin arrows indicate additional goals that could

be met by each mechanism.

The goals and the allocation mechanisms designed to address them, described in Table 1, are applicable to our hypothetical fishery, but also address a gap in the literature of novel approaches to allocation that can be applied to meet the broad spectrum of goals identified for small-scale fisheries. However, a fishery should still undertake a process such as the one described above to determine the particular goals, values, and needs of its stakeholders.

4.4. Addressing tradeoffs

In our hypothetical fishery, as in any fishery, there will inevitably be tradeoffs to be made in choosing among various allocation mechanisms to address different stakeholder goals. For example, the idea of implementing a subsistence reserve in order to meet the goal of “ensuring the welfare of people dependent on the fishery” is likely to create a tradeoff with the goal of “enhancing economic viability and security of the fishery”, because the area or total catch available for commercial fishers to access will be reduced by some percentage. Similarly, utilizing the scheduled redistributions mechanism to allow for new entrants to the fishery in the future, thereby meeting the goal of inter-generational equity, reduces the amount of resource available to support people who are currently dependent on the fishery.

In our hypothetical fishery, the stakeholders would examine all such tradeoffs and determine which goals and values should be prioritized. Ideally, allocation mechanisms can address multiple goals, likely with some tradeoffs against meeting each goal. For example, careful consideration could allow stakeholders to identify the smallest possible subsistence reserve that can meet the needs of dependent parties without decimating the profits of commercial fishers, or a subsistence reserve could be sited in an area less-used by commercial fishers.

Table 1
Examples of Allocation Mechanisms for Small-Scale Fisheries to meet Non-Economic Goals.

Goal	Allocation Mechanism	Description
Preservation of Socio-Cultural Values: Counter the undesirable social impacts of market momentum, or prevent market forces from reducing the sociocultural benefits of the fishery, including small scale fishing jobs, local employment, gear and sector diversity, and cultural heritage techniques.	<i>Allocation Formula based on Socio-Cultural Criteria</i> (e.g., “use of traditional gears,” etc.)	Appropriate, measurable sociocultural criteria can be identified and agreed to by stakeholders, and used [in place of catch history] when calculating participants' quota percentages. For example, allocating more to fishers who have participated in the fishery or lived in the community longer, or favoring fishers who utilize traditional gears or techniques, etc.
Inter-Generational Equity: Meet the needs and priorities of future generation and allow for new entrants to the fishery.	<i>Scheduled Redistributions</i>	Small portions of allocations can be redistributed over time at scheduled intervals to allow others a chance to enter the fishery if the size of the resource increases.
Enhancing Economic Stability and Adaptability of the Fishery: Safeguard against environmental or market fluctuations that might alter availability/accessibility of stocks, while also creating opportunities for growth and innovation that allow for increased welfare of participants without further depleting over-capitalized stocks.	<i>Allocate Flexible Species Portfolios</i>	Fishermen receive a permanent percent shares of a multispecies fishery or species complex (e.g., percent of the “groundfish fishery”). Then periodically assess stock status of each species and adjust the poundage of each species individually that can be caught each season, allocate poundage of each species to harvesters annually. In data-limited contexts, the framework can be put into place (portfolio allocations) at the outset, while at the same time data collection systems are implemented to enable the annual adjustments in the future.
Maintain Collective Stability Over Time: Ensure continued group cohesion as new entrants join the fishery, and prevent future conflicts as the fishery system evolves	<i>Apprenticeships</i>	Programs can be created which foster the entry of new fishers by requiring them to serve an apprenticeship with an existing fishery participant before they receive an allocation to ensure they understand the norms of the fishery.
Welfare of Vulnerable and Highly Dependent Groups: Meet the needs of vulnerable, fishery-dependent people by ensuring that fishery benefits and opportunities do not flow away from them largely (or exclusively) towards individuals who already have the most resources. Reduce or eliminate incentives for need-based illegal fishing by those with limited options.	<i>Allocate to a Community Development Entity</i>	Allocate access directly to an entity dedicated to community development which can then lease out quota or access to generate funds to spur economic development and livelihood diversification in the community.
	<i>Livelihood and Subsistence Reserve</i>	Retain a small portion of fishery quota or permits (e.g., 10%) to be provided annually to those who require access to the fishery for subsistence or as an economic backstop for the poorest members of the community.
	<i>Allocate to Disadvantaged Groups</i>	Allocate access specifically to marginalized groups which can use it to fish or lease it out for income.
Adaptive Stakeholder Capacity: In a fishery pursued by more than one stakeholder group, prioritize the needs of those groups least able to adapt to change or with limited livelihood alternatives when resources are less abundant, while allocating more to more adaptive groups during abundant years.	<i>Allocate on a Sliding Scale</i>	A sliding scale allocation formula can allocate a higher proportion of fishery resources (i.e., quota or access) to fishers less able to adapt when abundance is low. As the stock increases, the proportion of the allocation to more adaptive fishers can increase.

4.5. Iterating, evaluating outcomes, and adapting

In our hypothetical fishery, these possible allocation mechanisms and their tradeoffs would be iterated upon until an agreed upon solution is reached. An appropriate allocation system in our hypothetical fishery might be made of a combination of a number of these mechanism options. Allocating on a sliding scale between the local artisanal fishers and the transitory fishers, such that the former gets a larger proportion of the allocation when the stock is smaller (because they have less capacity to adapt), and the proportion allocated to the latter grows as stock health grows, can help to ensure the continued existence of the artisanal sector along with their cultural fishing traditions. This mechanism can also incentivize sustainable resource use from the migratory fishers, who otherwise have few incentives to preserve long-term stock health (as they can easily move to a new community if the local stock crashes). Within sectors a simple formula could be utilized to allocate based on the number of years of fishery participation (with individual allocations increasing as years in the fishery increase), thereby preserving fishing opportunities for long-term fishers.

The stakeholders might also choose to allocate “portfolios” of stocks (as opposed to allocating shares of only the high value grouper species). Doing so can help safeguard the economic stability of the fishery, and increase the adaptive capacity of the participants, against potential environmental or economic shifts that might alter the availability or accessibility of target species. Including some underutilized stocks in these portfolios might also encourage innovation around ways to more efficiently catch those species, should those species become more accessible or valuable over time, thereby creating an alternative to

continued overfishing of overcapitalized species. In addition, incorporating the concept of apprenticeships into the allocation system, whereby individuals wishing to enter the fishery would spend a season or two “apprenticing” with existing fishery members before they are granted their own allocation, would help to reduce conflict between newer and older fishery members, and help to preserve the norms and customs of the fishery and community (as well as reducing the opportunities and incentives for participation of transitory fishers, who generally share fewer of the community's values). These quota allotments for new entrants could come from pre-agreed periodic scheduled quota redistributions, or a portion of the quota could be set aside at the outset to allow for new entrants in the future. Finally, the stakeholders could set aside a small area or portion of allowable catch for the subsistence fishers to access. Size and gear restrictions could be implemented in this area to prevent excessive damage from these participants.

It is important to remember that this process should be not only iterative but also adaptive, which allows for the prioritization of some goals in the near term, but the possibility to prioritize other goals, and through other allocation mechanisms, in the future. Stakeholders should put in place monitoring systems that can track the efficacy of their new fishery management system at meeting their agreed-upon goals, and should agree at the outset to a timeline for re-evaluating, and potentially revising, their system based on this information.

5. Discussion and conclusions

Allocating fishing rights to small-scale fishers and other stakeholders can provide food and livelihood security, and help to protect

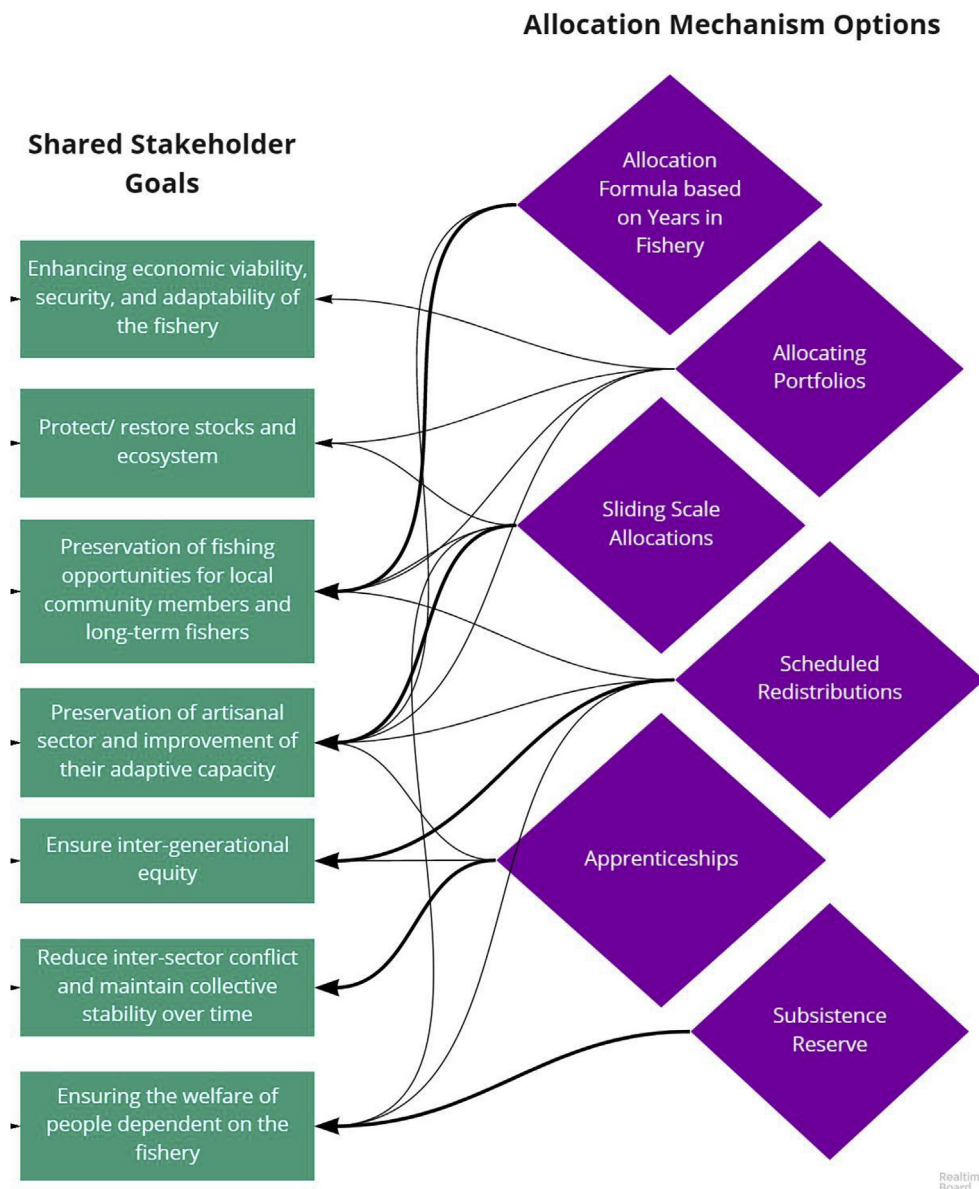


Fig. 3. Allocation mechanism options and the fishery goals they might help achieve.

and foster human rights, (FAO, 2015) by protecting access to fishery resources from industrialized fleets or other more powerful economic interests. However, allocation is contentious by nature and there are few examples from the literature of how to go about allocating these rights in such a context. The process of allocation must by necessity follow a different path for small-scale fisheries than it does for data-rich, industrialized fisheries elsewhere, because of a lack of existing data upon which to base decisions, the diversity of stakeholders and stakeholder goals in small-scale fisheries, and the complex and interconnected nature of small-scale fisheries. This paper lays out a process for arriving at methods to allocate fishing rights in small-scale fisheries, and provides an example of how this could be applied to a hypothetical fishery. We also offer up some new allocation mechanisms that do not rely on using catch history data or allocate exclusively based on previous participation in a fishery, but could instead address some of the broader goals of small-scale fisheries. The mechanisms described are far from an exhaustive list; the intent of a stakeholder-driven allocation process such as the one outlined here is to determine the allocation methods that are best suited to meeting the particular values and goals of fishery stakeholders.

The process and the example described here do have limitations. Rights allocations are just one component of a broader fisheries system. Fishery managers and other stakeholders need to think holistically about all of the parts of a fishery system and how fisheries fit into the greater sociocultural, economic, and ecological context of a community. If there are external drivers affecting the fishery, those may need to be effectively addressed in order for fishing rights to grant any benefits to fishers. This includes factors that directly affect the fishery, such as illegal fishing, as well as external drivers, including economic factors such as markets for particular species, ecological considerations such as pollution or habitat loss, and social factors such as conflict. There are a set of underlying conditions that must exist for fishing rights to benefit the community and its stakeholders. Allocating fishing rights can be a means of promoting human rights for small-scale fishers, who are often among the most vulnerable and marginalized populations, but often allocation alone will not be sufficient to ensure the promotion of human rights. Fishery managers or the appropriate government entity may need to have a plan in place to address these concerns before rights allocation can be undertaken.

Finally, allocating fishing rights is just one aspect of sustainably

managing fisheries. Small-scale fisheries should also have mechanisms in place to enforce and reaffirm these allocated rights and ensure access to allocated stakeholders, which otherwise may be eroded over time. These include monitoring of fishing activity and enforcement of regulations and rights, to ensure users are not exceeding their allocation and outsiders are not harvesting the resource without permission, and implementing broader fisheries management measures to assess the health of the resource and implement restrictions when necessary to ensure continued sustainability. These elements may be a function of the government, or may be done by the fishers themselves through a community-based management process. To be successful, an allocation process will need to take into account the capacity for monitoring and enforcement of the fishery, and whether these can occur either formally or informally to uphold the rights allocated. Ensuring fishery resources are not being harvested by users external to the allocation process, and that the fish stocks themselves are sustainable, will ensure stakeholders can continue to benefit from the rights that are allocated to them.

Perhaps the most important aspect of developing an allocation process for small-scale fisheries is recognizing the diversity of goals that are likely to exist in such a fishery, and developing a process that incorporates as many of these goals as possible, while clearly identifying the necessary tradeoffs for meeting each goal. Identifying goals and tradeoffs does not guarantee success in an allocation process, but where there are multiple stakeholder groups with competing interests, allocation is not likely to be successful without taking their goals into account in a process like the one outlined here. This approach is not unique to small-scale fisheries; indeed, identifying stakeholder goals for allocation and the tradeoffs that will result should be part of any fishery allocation process. More real world applications of fishing rights allocation in small-scale fisheries and additional examples from the field are necessary to provide a better understanding of what types of allocation mechanisms best address particular types of goals. A suitable next step could be to develop a typology of stakeholder goals in small-scale fisheries and the allocation methods that best address them, expanding on the examples provided herein. As the importance of fishing rights for small-scale fisheries is increasingly recognized, the need for allocation methods that can be applied in such a context is becoming clear. This paper provides a first step toward identifying how to allocate fishing rights in small-scale fisheries.

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Declarations of interest

None.

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Appendix A. Supplementary data

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